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ABSTRACT

Intended for grades K-2, this science unit on coastal ecosystems aids teachers in helping students to: (1) identify marine organisms; (2) learn their basic characteristics; and (3) understand the web of interdependence among organisms of the same habitat. The teacher's guide is divided into four sections. The first section gives background information about ecosystems. The second section provides detailed directions on how to collect specific marine plants and animals and includes an application for a permit to collect organisms. The third section explains how to set up and maintain a salt water aquarium, and provides a feeding schedule and list of supply houses, as well as a supplementary booklet for student use. The last section identifies various considerations related to conducting field trips. These include, among others, site selection, scheduling, permission slips, emergency information, clothing, parent volunteers, and equipment. It then outlines specific information for four field trips, including pre- and post-trip activities, investigation procedures, and discussion questions. Student work booklets for each of the trips (pier and jetty, sandy beach, mud flat, and salt marsh) contain pictures of organisms they will collect and questions to answer. (DC)

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Coastal Awareness & Public Education
PROJECT Care

COASTAL ECOSYSTEMS

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PROJECT CAPE TEACHING MODULE

Developed under an ESEA Title IV-C Grant

Dare County Board of Education
P. O. Box 640
Manteo, North Carolina 27954

Dr. Carolyn H. Hampton
Project Director

William T. Martin
Curriculum Specialist

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GRADE LEVEL: K-2

SUBJECT: Science

AUTHORS: Michael Cowal, Nancy Cowal
Toni Weston

CONTRIBUTOR: William T. Martin

EDITOR: Carolyn H. Hampton

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ACKNOWLEDGEMENTS

School Administrators
Dare County Schools
Manteo, North Carolina

Superintendent
Mr. Stephen G. Basnight, Jr.

Assistant Superintendent
Mr. Willie E. Huber

Elementary Supervisor
Mrs. Jeannette Gard

Secondary Supervisor
Ms. Joyce Jordan

Consultants

Consultant
Dr. Ione Perry
Division of Development
North Carolina State Department
of Public Instruction
Raleigh, North Carolina

External Evaluator
Dr. P. Barry Hounshell
School of Education
University of North Carolina
Chapel Hill, North Carolina

Unit Reviewers

Mrs. Maxine Claar
Graham High School
Graham, North Carolina

Dr. Carol D. Hampton
Department of Science Education
East Carolina University
Greenville, North Carolina

Dr. Charles R. Coble
Department of Science Education
East Carolina University
Greenville, North Carolina

Mr. Gerry Madrazo, Supervisor
Alamance County Schools
Graham, North Carolina

Dr. Ira Trollinger, Principal
South Mebane Elementary School
Mebane, North Carolina

Mr. Rhett B. White, Director
North Carolina Marine Resources
Center/Roanoke Island
Manteo, North Carolina

Support Staff

Typist
Mrs. Robin Jackson

Production Assistants
Mrs. Nancy Reynolds
Miss Doris O'Neal

UNIT CONCEPTS

I. WATER AND NATURE

A. Water affects living organisms.

1. Water sustains all living organisms.

2. Water provides habitats and protection for living organisms.

3. Organisms and aquatic environments are in constant change.

4. Aquatic organisms are adapted to their environment in different ways.

5. Aquatic organisms interact in balance with their environment and with other organisms.

PREFACE

Children have an inherent love of the coast and a natural inquisitiveness about coastal life. This desire to learn can be easily nurtured by a multi-disciplinary marine curriculum by permitting children to become actively involved in their environment.

Ages five to eight years are important developmental periods in a child's life. This is the period of sensory-motor development during which children grow from far-sighted non-readers with poor eye-hand coordination to accomplished readers with keenly developed motor skills.

Through this period children's activity levels are high and their attention spans are slowly lengthening. Group activity learning through play and direct participation in learning is important during these years. To be effective, a marine-related curriculum must address itself to these needs. Teaching strategies must permit children to make their own observations and learn through discovery. Experiences must allow children to be actively involved in learning about our coastal environment.

Today's youth will be assuming important roles as adult citizens in society. As citizens and voters, no matter what their occupations may be, they will be asked to make decisions that will affect our marine resources. We must assist our youth in acquiring the experiences, knowledge, and concern

necessary for making informed environmental decisions.

The materials provided with this unit will aid the teacher in helping children to: (1) identify marine organisms, (2) learn their basic characteristics, and (3) understand the web of interdependence among organisms of the same habitat.

It is suggested that this unit be used in conjunction with Water World Creatures and Sea Creature Treasury, the companion units for kindergarten through second grade.

-Michael and Nancy Cowal

EXPLANATION OF CODING SYSTEM FOR SUPPLEMENTARY MATERIALS

GRADE LEVELS AND SUBJECTS	CODE
K-2 Multidisciplinary	K-2a, K-2b, K-2c
3-4 Multidisciplinary	3-4a, 3-4b, 3-4c
5-6 Multidisciplinary	5-6a, 5-6b, 5-6c
SECONDARY SCHOOL	
English	ENG
Occupational Education	OE
Social Studies	SOC
Science	
Life	SC1
Earth	SC2
Biology	SC3

LESSON NUMBERS	
1	1.
2	2.
3	3.
etc.	etc.

SUPPLEMENTAL MATERIALS	
1	.1
2	.2
3	.3
etc.	etc.

EXAMPLES

K-2a
1.1 Translates: a supplemental sheet, booklet or game number 1 that accompanies the 1st lesson of Unit K-2a for grades K-2.

SC2
6.4 Translates: a supplemental sheet, booklet or game number 4 that accompanies the 6th lesson in Unit SC2 for earth science.

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ECOSYSTEMS

The aquatic environment makes up one of the largest ecosystems in the world. An ecosystem is a unit in which living organisms and the nonliving factors are interacting. The living organisms are the animals and plants. Some important nonliving components are light, water, temperature, air, chemicals, sand and soil. Ecosystems are of different sizes and occur in different places: a forest, a beach, a marsh, fields and streams, and a classroom aquarium. Aquatic organisms are adapted for survival in their ecosystem.

The animals and plants in an ecosystem can be grouped according to the way they obtain their food energy. Green plants capture energy from the sun and through the process of photosynthesis store it in the form of starch. The plants are eaten by animals. Animals use the plant food to obtain their energy. These animals may in turn be eaten by other animals. This way energy is passed on from one living thing to another. A food chain transfers energy from the sun through green plants to a chain of animal life. A food web is formed when several food chains are linked together. An ecosystem is the balanced system comprised of the living organisms and the nonliving factors in an area.

In the marsh, green plants die and decompose, bacteria and fungi grow on the decomposing plants. Smaller organisms eat the bacteria and fungi and another food chain is started.

Children have an inherent love of the coast and a natural inquisitiveness about coastal life. Field trips offer children the opportunity to study coastal ecosystems through their own observations

and to learn through discovery. Field trips teach and reinforce the identification of living organisms and the web of interdependence in coastal ecosystems.

Schools that are farther away from coastal ecosystems do not have to forego this valuable learning experience. If you cannot take the class to the ecosystem, bring the ecosystem to the class. A salt water aquarium is a miniature coastal ecosystem. With a classroom aquarium, children will be able to observe the marine life, identify animals, and learn about the interdependence of living and nonliving things.

COLLECTION OF MARINE ORGANISMS

Salt marshes, jetties, mud flats and open beaches offer a wealth of hardy organisms which can be kept in salt water aquaria. Careful planning is required to insure that marine organisms get to the classroom alive and healthy. Factors to consider in planning a collection trip are: state laws governing the collection of organisms, selection of collecting sites, collecting equipment, collecting procedures, and transportation.

Collecting Permits

Special permits are required by North Carolina and many other states for the collection of marine organisms. These permits are available through the North Carolina Division of Marine Fisheries. Section 3c/.0209 Scientific Collecting Permit states:

> No person shall take any marine or estuarine species which is out of season or otherwise protected for scientific purposes unless he first secures a scientific collecting permit from the secretary. If the secretary determines that the request is for a valid scientific purpose and will not result in a significant adverse effect on fisheries management, the permit will be issued. Such permit will be subject to any restrictions concerning area, times, and sampling methods as the secretary deems appropriate.

A copy of the "Application for Permit to Collect Marine and Estuarine Organisms for Scientific Purposes" is found at the end of this section. The application should be completed and mailed to: Division of Marine Fisheries, P. O. Box 769, Morehead City, North Carolina, 28557.

Materials for Collection

1. Shovels and trowels - these can be used to dig coquina clams, mole crabs, clams and scallops.
2. Sieves or strainers - used to strain off sand and to make the animals more accessible.
3. Seine nets - used for collecting fish and shrimp.
4. Dip nets - used to collect small fish.
5. Plastic bags - can be used in the transportation of small fish and marine algae.
6. Buckets and lids - multipurpose use.
7. Wax milk cartons - multipurpose, use as scoops and transportation.

Collecting and Transporting Plants and Animals

Plants

1. Plants such as Sea Lettuce (Ulva) should be collected attached to rocks and shells. Do not remove the plant from its foundation.
2. Guest Sponge seaweed (Codium) can be collected either attached or unattached to a foundation.

   Hint: For aquarium purposes sea lettuce is the hardier of the two plants.
3. Eel grass (Zostera) should be carefully dug to get the root system.

Organisms	Method
1. Coquina clams Mole crabs	Using a trowel or scoop, dig some wet sand from the surf zone. Empty the trowel or sand into a tea strainer or

Organisms	Method
(Coquina clams mole crabs cont.)	sieve. Lower the strainer and allow the water to gently flow over it. Drain off the water leaving the organisms in the strainer.
2. Scallops and clams	Using a trowel or scoop, dig some wet sand from the surf zone. Empty the trowel of sand into a tea strainer or sieve. Lower the strainer and allow the water to gently flow over it. Drain off the water leaving the organisms in the strainer.
3. Marsh periwinkles	The periwinkles are found on cord grass in salt marshes. They are easily picked off the plants. If periwinkles are to be maintained in the classroom, plots of cord grass should be dug with a trowel being careful not to damage the roots. Do not shake the soil loose from the plants. Place a plot of cord grass in an aquarium and add enough estuarine water to keep the root system wet.
4. Starfish	If attached to rocks, jetties, or pilings, starfish should be gently pried off.
5. Fish and shrimp	These may be collected by using dip nets or by pulling a seine net.
6. Mud snails	These may be collected in shallow estuarine waters by hand.

Bedding and water levels are important when transporting organisms. Water levels should be shallow. Arrange milk cartons in an ice chest. Place seaweed in the bottom of each carton and put just enough water to cover the seaweed. Place no more than three invertebrate animals on the bed of seaweed. The animals should not be submerged in the water. Fish and shrimp should be transported in buckets containing enough water to cover them.

No matter what is being collected, use good judgement. Never take more than you need and return the animals to their habitats when you are finished.

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES

AND COMMUNITY DEVELOPMENT

DIVISION OF MARINE FISHERIES

P. O. Box 769

MOREHEAD CITY, NC 28557

APPLICATION FOR PERMIT TO COLLECT MARINE AND ESTUARINE ORGANISMS FOR SCIENTIFIC PURPOSES

DATE_____

NAME_____ INSTITUTION_____

ADDRESS_____ POSITION_____

_____ EDUCATION_____

PURPOSE OF COLLECTIONS:_____

_____

_____

_____

_____

METHODS:_____

_____

_____

SPECIES:_____

_____

WATER BODIES AND COUNTIES:_____

_____

_____

TIME OF COLLECTIONS:_____

_____

I have read the restrictions for issuance of this permit reprinted on the reverse side and agree to abide by them and any other restrictions which may be imposed.

_____

Signature

The permit will be subject to the following general conditions:

1. The collections shall be used for scientific or educational purposes only; shall be dedicated to public benefit; and shall not be used for commercial profit.

2. This permit may be used only by the person to whom it is issued.

3. That the permittee furnish this office a summary of the material collected under this permit no later than January 15 following the year the permit is in effect.

4. This permit shall immediately terminate upon violation of any of the conditions herein contained.

SALT WATER AQUARIUMS

Small gallon jar aquariums can be easily established and maintained in a classroom. These types are ideal for areas which have a limited amount of space. By having several one-gallon aquariums, the variety of habitats can be increased to show children the diversity of organisms in salt water communities. A large aquarium for the entire class can be set up by the students with instructions from How To Set Up A Salt Water Aquarium.

Equipment

Aquarium

In establishing a successful salt water aquarium set-up, care should be taken to secure the proper equipment. Small one-gallon plastic aquaria can be purchased through a biological supply house. Gallon glass jars from a cafeteria or restaurant make good substitutes and are usually obtained at little or no cost. The container should be clean and have a glass or plastic lid or cover. Should the container need cleaning, wash it with salt water. Covers may easily be obtained by using glass from old picture frames or lids from plastic containers. Make sure the glass is polished with no rough edges.

Filter

Undergravel filters are preferred and can be purchased from pet shops and biological supply houses. Filters are important even to the smallest aquariums because they help to eliminate

waste materials produced by the organisms. This elimination reduces tank contamination. Each type of filter requires an air pump connected by air tubing for operation. Before installing the undergravel filter, be sure to read the manufacturer's instructions. An alternative to using an undergravel filter is to place an airstone in the bottom of the jar.

Gravel or Sand

Before using any gravel or sand, it should be cleaned with freshwater. To clean, place the substrate in a container and pour enough freshwater to cover it. Stir the water and substrate and then pour off the floating particles. Repeat this process until there are no particles and the water appears clear.

Water

Obtaining sea water for the tank can be difficult, especially if you live in inland areas. When possible, gather estuarine and sea water from the habitat of the organisms to be used in the aquarium. When collecting water, do not take water close to shore but wade out a few meters to collect it. (Water near shore is often more polluted.) Collect enough water to have a reserve for changing the water in the tank. Store this water in closed containers and in a dark place. Before using any estuarine or sea water in the aquarium, filter it through several layers of nylon stocking or polyester fiber.

If natural sea water is not available, commercial sea salts may be used and can be purchased through a biological supply house or a pet shop. The sea salts are combined with aged tap water to produce an effective salt water solution. (To age tap water,

let it stand uncovered for 72 hours before using to allow gaseous chlorine to escape.) After aging, store any reserve water in a covered container and in a dark place. This will prevent the growth of algae. Always use a reputable brand of sea salts and follow the directions for mixing as some brands may vary.

Lighting and Temperature

The aquarium should be kept out of direct sunlight as this encourages the growth of algae and can overheat the tank. Rapid extreme temperature changes may cause death of the organisms.

The Set-Up

Before setting up the tank, use the checklist below to make sure you have the needed eqipment.

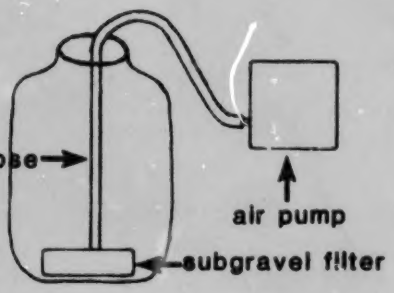
_____ One-gallon container(s)
_____ Air pump
_____ Air hose
_____ Air stone or under-gravel filter
_____ Crushed shells and/or sand
_____ Sea salts and aged tap water or water from the natural habitat

Steps

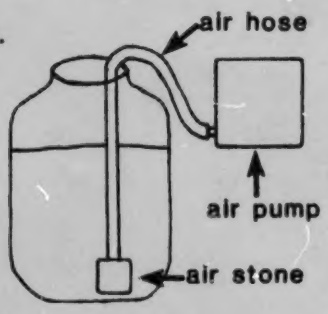
1. Select a place for the aquarium, out of direct sunlight and with access to an electrical outlet.
2. Make sure the tank is clean. If the tank has algae encrusted on the sides, clean it with a mixture of clorox and water and then rinse it thoroughly with salt water. Be sure the odor of clorox is gone before using. NEVER USE SOAPS OR DETERGENTS TO CLEAN THE AQUARIUM EQUIPMENT!!

3. Follow the illustrations for setting up the aquarium.

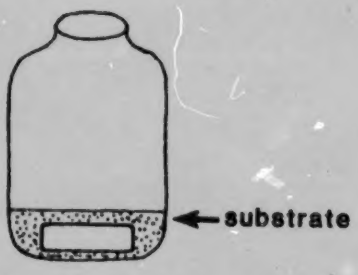
a.1.



a.2.

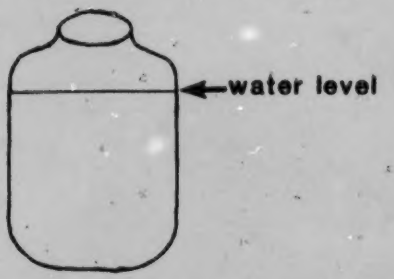


b.



Add 2.5 to 3.0 cm of substrate.

c.



The water level should be just below the point where the jar curves to form the neck. (This allows for maximum surface area.) After filling the jar with water, mark the water level on the outside of the it with a grease pencil or a piece of tape.

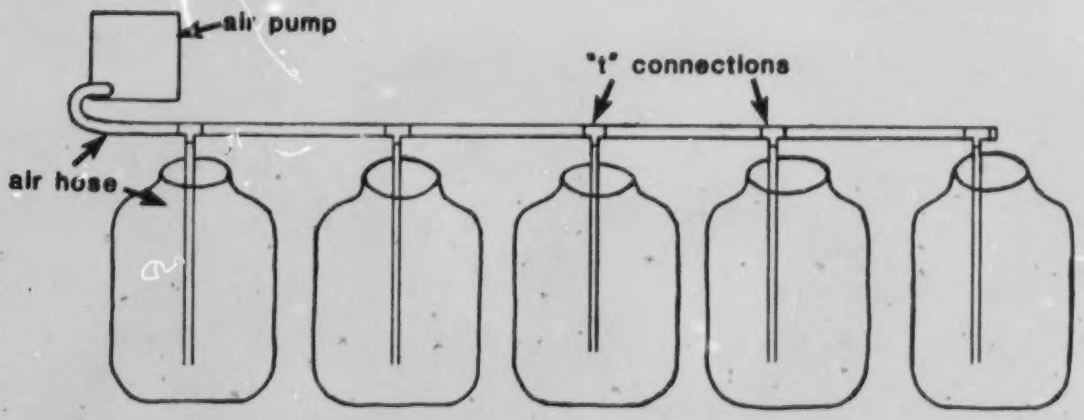
4. Place the lid or cover on the jar. This will help to reduce the rate of evaporation.
5. Plug the cord of the pump into a wall socket and aerate the tank for about 72 hours.

6. Place the pump above the water level, to prevent back flow of water in case of power failure.

Alternative Set-up

It is possible to operate several aquariums on the power of one pump. No more than five (5) containers per pump are recommended.

For this set-up the only extra equipment needed is one "t" connection per container. "T" connections are available from biological supply houses. The set-up should look like this:



Introduction and Acclimatization of Organisms

Choose hardy organisms for your aquarium. These organisms can survive moderate temperature fluctuations which may occur due to vacation days and other times when schools might reduce temperatures. Do not overcrowd the tanks. Two or three small organisms are plenty for one-gallon tanks. Care should be taken

not to place predator and prey species in the same tank. Some possible combinations follow.

1. clam and hermit crab
2. medium sized oyster and several small anemones and two or three small shrimp
3. medium sized oyster with barnacles and one killifish
4. razor clam and one or two sheephead minnows
5. small blue crab and two or three marsh periwinkles

For animals to survive, they must be allowed to become gradually accustomed to their new environment. This will take anywhere from 30 to 60 minutes.

Steps for Acclimatization

1. Float the organisms and the water from their habitat in a plastic bag in the tank.
2. Gradually add some of the aquarium water to the bag until the temperatures of the waters are the same.

A schedule for feeding the animals can be found at the end of this section. Do not overfeed the animals. Feed them only what can be consumed in 1 or 2 hours. After that time, remove any food which has not been consumed. Removal will help to keep the tank contamination rate down.

Maintenance

Maintaining the aquarium can be relatively simple. As evaporation occurs it may be necessary to add aged tap water to the tank between changes. Add the aged tap water to the level indicated on the jar with tape or a grease pencil mark.

Approximately once a month one-fourth of the water should be siphoned off and replaced with the same amount of new salt water. Before doing this, allow the water to be added to stand

in the same area as the aquarium until the temperatures of the two are equal.

If the water becomes cloudy, rinse the filter or airstone in salt water. Begin "The Set-up" from Step #1.

Organisms do die. It is important that dead organisms be removed immediately to prevent further contamination.

Someone should be responsible for the care and feeding of animals during vacations and holidays. When the class has finished with the organisms, they should be returned to their habitats. Use the same method of acclimatization described above for returning organisms to their natural habitat.

FEEDING SCHEDULE

Organisms	Food	Schedule
Crabs, starfish, moon snails	Feed chopped fish, shrimp, earthworms, lean beef placed near or under the animal.	Once a week
Sea anemones	Crush food with sea water into a watery paste. Pipette over the tentacles and polyps.	Three times a week
Barnacles, scallops, clams, oysters, sponges, sea squirts	Feed finely powdered fish food, Daphnia, freshly hatched brine shrimp.	Three times a week
Sea urchins	Feed natural growth of algae in tank, small pieces of lettuce or spinach.	Once a week
Killifish, pinfish	Feed dry fish food.	Daily
Silversides	Feed living brine shrimp or Daphnia.	Two times a week
Fiddler crabs, hermit crabs, mud snail, sand dollar, pipe fish	These species will aid in cleaning the aquarium of dead and decaying materials.	

Taken from: Hampton, Carolyn H. and Carol D. Hampton. "Care and Maintenance, A Saltwater Aquarium." Science and Children, Vol. 18, No. 2 (October 1980), 30-32.

SUPPLY HOUSES FOR AQUARIA APPARATUS AND MARINE ORGANISMS

Turtox/Cambosco
MacMillan Science Co., Inc.
8200 S. Hoyne Avenue
Chicago, IL 60620

Carolina Biological
Burlington, NC 27215

Aquarium Systems Inc.
1462 E. 289 Street
Wicklittle, OH 44092

Biometal Associates
BioQuip Products
P. O. Box 61
Santa Monica, CA 90406

R. F. Carle Company
P. O. Box 3155
Chico, CA 95926

Dayno Sales Company
678 Washington Street
Lynn, MA 01901

Jewel Aquarium Co., Inc.
5005 W. Armitage Avenue
Chicago, IL 60639

NASCO
Fort Atkinson, WI 53538

Pacific Bio-Marine Supply Co.
P. O. Box 536
Venice, CA 90291

Pets Unlimited
903 Hennepin Avenue
Minneapolis, MN 55403

Southern Biological Supply Co.
McKenzie, TN 38201

FIELD TRIPS

Field trips are one of the most valuable teaching aids an instructor can use. However, for a field trip to be effective, special care and planning must take place. A field experience which is carefully planned can open many new avenues for exploration which would otherwise not be possible in a normal classroom.

Many things must be considered when planning a field trip. A good field experience should have a well-defined purpose. Field trips without a specific goal are invitations to disaster. The trip should implement a "learn by doing" strategy.

Selecting a field site - There are many areas in your community which can be used as alternative classrooms. In choosing a site, make sure that the area will meet your specific needs.

You should make a preliminary visit to the study site to become familiar with its resources. Being familiar with the area will help eliminate some confusion the day of the trip. If you are knowledgeable about the field site, you can plan activities which suit the area and will provide the students with an interesting and effective learning experience.

Time allotment - After making a preliminary visit to the site, you should determine how long the trip will take and plan activities accordingly. In planning, allow plenty of time for travel. Depending on the age and attention span of the group,

time allotment for activities may vary. A sample schedule can be found at the end of this section.

Activity planning - In planning activities you should set a goal or goals to be accomplished. Activities for younger children should center around the senses: touching, smelling, tasting, hearing and seeing. All the words in the world cannot accurately or so vividly describe the walk of a crab or the feel of a sea urchin. Hands-on experiences often prove to be the most worthwhile. Each activity should flow smoothly to the next.

Permission slips - Signed permission slips should be secured from each child's parent or guardian. The slip should contain: the place to be visited, the date of the trip, the time and place of arrival and departure, cost, information about meals, a list of any special clothing needed and information on any allergies or medication. A sample permission slip can be found at the end of this section.

Emergency locator cards - Before the trip, each child should have his/her parent fill out one of these cards. The teacher should keep these at hand at all times. A sample locator card is found at the end of this section.

Transportation - There are several options as far as types of transportation. If the site is within safe walking distance of the school, you may choose to walk. A "safe walking distance" should be determined by the teacher with the advice of the principal. Travel by car or bus is another option. Many school

systems require bus travel as opposed to travel by private cars to avoid any legal problems which might occur in the event of an accident. This places the responsibility on the school and not on the parents. A school activity bus with a licensed bus driver is recommended. It is advisable to have one car accompany the bus in case of an emergency.

Clothing - Clothing should suit the area to be studied. Field trips to indoor facilities do not usually require special clothing. Ordinary school clothes and a good comfortable pair of shoes will usually suffice. Outdoor field experiences are different. If exploring a wooded area or coastal areas, students should wear an old pair of jeans, long-sleeved shirts and hiking shoes or some other sturdy shoes. Shoes must be worn at all times on all field trips. Sandals and shorts are not recommended. Use your own judgement and make students and parents aware of the clothing guidelines before the day of the trip.

Orientation of parent volunteers - Parents are often willing to help with supervision on field trips. Do not be afraid to ask. A brief meeting with parents to orient them to the activities of the day is advisable. They can be a great help if they know what is going on. Be specific about what you expect them to do and their responsibilities. If the students are to be divided into groups, have a list of the group each parent will be responsible for. Devise some easy method of identification so that the parent may readily "count heads." Name tags are not the most practical

means of quick identification. You might have each group wear a different shape or colored tag. This way, at a quick glance the volunteer may easily identify the group members. To assure adequate supervision there should be one adult for every five children.

Tools and materials - If special tools or materials are needed for the field study, gather these in advance and make provisions for their transportation to the site. A parent might transport these in a vehicle. Some tools and materials are easily made. A class period might be spent in the construction of these materials by the students. This gives them an active part in the field trip preparation. If the materials are to be distributed by the group leader, give each a check sheet listing the items.

Safety and first aid - Of all things to be considered when planning a field trip, safety is the most important. It should enter into every decision you make such as: study site, transportation, clothing, etc. Tragedies have occurred because the basic concerns of safety were not observed. Caution cannot be stressed enough when speaking to the children. Minor cuts or scratches are bound to occur, therefore, you should carry a well equipped First Aid Kit. The kit should contain:

assorted bandaids	compresses	ice pack
antiseptic	cotton swabs	first aid manual
adhesive tape	ammonia inhalants	ace bandage

The kit should be checked before each trip to be sure it is complete. Students with allergies (bee stings, etc.) should be identified and the group leaders should be informed. Should the

student need medication, a note and the medication should be secured from the parent.

At the end of any outdoor trip, have the students check for ticks. Should any be found, carefully remove them and notify the parent.

SAMPLE SCHEDULE

8:30 - 8:45	Load buses
8:45 - 9:15	Departure from school
9:15 -11:30	Site orientation and activities
11:30 -12:15	Lunch and clean-up
12:15 - 2:00	Activities
2:00 - 2:30	Departure from site
2:30 - 3:00	Review of the day
3:15	Dismissal

FIELD TRIP PERMISSION SLIP

Dear Parents:

On _____ our class will be taking
(Date)

a field trip to _____. We will
(Location)

leave from _____ at _____
(Place) (Time)

and should return at _____.
(Time)

Your child should bring:

1.

2.

3.

Your child should wear:

1.

2.

3.

Please complete and sign the slip below and have your child return to his/her teacher.

_____
(Teacher's Signature)

- - - -

EMERGENCY LOCATOR CARD

Name:_____
Address:_____
Parent or Guardian:_____
Phone work:_____ Home:_____
Allergies: (explain)

Medication: Yes_____ No _____ Type_____
Doctor's name:_____phone:_____
Dentist's name:_____phone:_____
In case of an emergency and I cannot be reached
call:_____ phone:_____
Parent's signature_____

FIELD TRIP PREPARATION

TEACHER CHECKLIST

_____ permission sheets

_____ emergency locator cards

_____ administrative approval sheets

_____ group identification tags

_____ parent volunteers

_____ 1 parent driver

_____ buses

_____ tools, materials, booklets

_____ boxes for transporting materials

_____ boxes for transporting lunches

_____ ice chest for transporting beverages

_____ trash bags

_____ first aid kit

PIER AND JETTY

TEACHER'S GUIDE SHEET

Site Description

Piers and jetties are found up and down the North Carolina coast. Organisms living in this ecosystem are subjected to wave action and great physical stress. Due to the high and low tides, each organism must be able to withstand some amount of drying.

Life in this ecosystem have special adaptations for survival. Organisms which might be found in this area are starfish, limpets, barnacles, mussels, sponges and sea anemones.

Before the Trip

Using discussion, find out what the children already know about piers and jetties. Record their ideas on an experience chart. Save the chart to compare with their knowledge later.

Questions for Discussion

1. What do you think a pier is? A jetty?
2. Where do we find piers and jetties?
3. What do you suppose we could find there?
4. What animals could you find at piers or jetties?

Field Trip

Special clothing

old pair of tennis shoes dry pair of shoes (for later)

shorts or a pair of pants that can be rolled up easily

Materials

observation booklets

pencils

Procedure for Investigation

1. Distribute the activity field guide booklets labeled "Pier and Jetty."
2. Have the students do "What Do I See?" as they stand beneath the pier or observing the jetty. (Jetties are slippery and can be very dangerous; proceed with caution!)
3. After students have finished "What Do I See?", have each child share his/her drawing with the class or assigned group.
4. Guide the students through the activities in the field guide, discussing movement, color, appearance and location.

   Questions for Discussion

   a. What living things do you see attached to the pilings?
   b. What organisms can swim freely?
   c. How do you think the organisms eat?
   d. How can you tell when the tide is high? Low?
   e. How do you think the starfish gets food from the piling?
5. Bring to the students' attention the positions of the organisms on the piling.

After the Trip

Discuss and record on an experience chart what the children saw on the trip. Discuss with the children what they have learned.

Questions for Discussion

a. What do you think holds the barnacles to the piling? The mussels? The anemones?

b. Why is seaweed near the top of the water?

c. In what order do the living things grow on the piling?

d. What would happen if this water became polluted?

e. Why might a soft-shelled crab be found on a piling?

Post Trip Activity

PIER SKITS

Skits can be used to reinforce learning and to bring about understanding. Have students do impromptu role-playing of various living and nonliving things, interactions, and the parts humans play. Variations are puppet shows and pantomimes.

Have the students demonstrate movement of different organisms. Examples: barnacles, starfish, sea anemone, crabs, etc.

Other situations which may be acted out are methods of obtaining food and life cycles.

SANDY BEACH

TEACHER'S GUIDE SHEET

Site Description

At first glance, the open beach may seem void of living organisms. Birds may be abundant while other forms of life seem non-existant. With a little investigation and digging other organisms can be found. Animals on the open beach must adapt to the conditions of the beach either by protective coloration or by burrowing. Organisms such as mole crabs can be found in the intertidal zone. Other animals found in the beach ecosystem are coquina clams, herring gulls, sand dollars and terns.

Before the trip

Using discussion, find out what the children already know about the open beach. Record their ideas on an experience chart. Save the chart to compare with their knowledge later.

Questions for Discussion

1. What is a beach?
2. What kind of water is found at a beach?
3. What kinds of organisms could we find there?

Field Trip

Special clothing

Shorts or a pair of pants which can be rolled up

old tennis shoes

Procedure for Investigation

1. Distribute the activity book entitled "Sandy Beach."
2. Have students do "What Did I See?" as they sit on the beach.
3. After students have finished "What Did I See?", have each child share his/her drawing with the class or assigned group.
4. Guide the students through the activities in the field guide, discussing movement, color and appearance, habitat and special adaptations.
5. Dig near the water to look for organisms.
6. Collect remains of animals to take to the classroom.

Questions for Discussion

a. What animal behavior can you observe?
b. Which animals stay out of the water, in the tidal zone, and in the water.
c. What is the beach like in winter? In summer?
d. What would happen if a house were built on the beach?
e. What do you think the sand is made of?

7. Have the students collect a small amount of shells, etc.

After the Trip

Discuss and record on an experience chart what the children saw on the trip. Discuss with the children what they have learned.

Questions for Discussion

a. What would happen if thousands of people came to the beach in summer all at once?

b. Why do the mole crabs live in the intertidal zone?

c. What do fish who live in the surf eat?

d. How is a ghost crab protected from predators?

Post Trip Activities

SKITS

Have the students act out the following problems:

1. Cars are driving on the beach and damaging and scaring animals in the area and their nests.
2. People are using illegal methods tc gather fish at the beach.

ART

Sea Collage

Materials

items from the beach
glue
crayons
8" x 8" pieces of masonite, plywood, or cardboard

Procedure

Have the students arrange the objects on the board. Students should glue them down after arranging. The students may wish to draw in some organism which could not be collected.

SALT MARSH

TEACHER'S GUIDE SHEET

Site Description

Salt marshes are found bordering salt water bays or sounds. At some point during the 24 hour day, marshes are flooded at high tide. They serve as homes and breeding grounds for many organisms. Among these, are the greenhead fly, fiddler crab, marsh periwinkle, killifish, raccoon and diamond back terrapin. Some dominant plants of the area are glasswort, spike grass, cordgrass and sea lettuce. Plan to visit the salt marsh at low tide!

Before the trip

Using discussion, find out what the children already know about the salt marsh. Record their ideas on an experience chart. Save the chart to compare with their knowledge later.

Questions for Discussion

1. What do you think a salt marsh is?
2. Where could we find a salt marsh?
3. What could we find there?

Field Trip

Special Clothing

old pair of tennis shoes extra pair of dry tennis shoes

pair of pants which the legs can be rolled up

Materials

plastic sandwich bags
observation books
pencils
mosquito repellent

Procedure for Investigation

1. Distribute the activity field guide booklets labeled "Salt Marsh."
2. Have students do "What Did I See?" as they stand at the edge of the salt marsh. (The Salt Marsh is a delicate ecosystem. Care should be taken to prevent children from roaming on their own through the marsh.) Students should draw what they see.
3. After students have finished "What Did I See?", have each child share his/her drawing with the class or assigned group.
4. Guide the students through the activities in the field guide, discussing movement, color, appearance and habitat.

   Questions for Discussion

   a. What living things do you observe in the mud? Grass? Water? Air?
   b. How do we know these organisms are living?
   c. What would happen if the water dried up?
   d. What would happen if we built a house on the marsh?
   e. What do you think it is like here at night? At high tide? In winter? In summer?
5. Have students collect small amounts of grasses, rushes, driftwood, shells and seaweeds.

After the Trip

Discuss and record on an experience chart what the children saw on the trip. Discuss with the children what they have learned.

Post Trip Activity

SUN PRINTING

Blue Print Paper Method

Materials

saltmarsh samples (grass, shells, wood)
blue print paper in light proof envelopes
manila folders
2 or 3 tubs of water
small amount of hydrogen peroxide
sheet of plastic wrap

Procedure

1. Place a few drops of hydrogen peroxide in each tub of water.
2. Have each student select the item(s) he/she wishes to sun print.
3. Using the manila folder as a tent to shade the blue print paper, have the children decide where the objects should be placed on the paper.
4. When everything is arranged on the paper, allow the sunlight to expose the paper for 40 - 60 seconds. Place the paper in the manila folder until ready for the next step.
5. Place the exposed paper in a tub of water for at least one minute. Move the paper around a little in the water

until a sharp image appears.

6. Remove the paper from the water. Allow it to dry.

Ozalid Paper Method

Materials (per group)

2 or 3 wide-mouth, plastic or glass gallon jars with lids

3 - 4 cups of gravel or sand

1 grocery bag for each one-gallon container

1 pint of household ammonia

ozalid paper in light proof envelopes (1 - 2 pieces per student about 15 cm x 20 cm)

plastic wrap

Procedure

1. Pour enough ammonia into the gallon jars to cover the bottom.
2. Put 2 cups of sand or gravel in each jar and mix with the ammonia. (Gravel should be deep enough to prevent ozalid paper from touching the ammonia.)
3. To reduce sunlight, place each jar in a grocery bag.
4. Using the manila folder as a tent to shade the ozalid paper, place the materials on the paper and cover them with a sheet of plastic wrap. (The plastic wrap holds the items flat on the paper.)
5. Expose the paper to sunlight for 30 - 60 seconds. Place the paper in the manila folder until ready for the next step.
6. Quickly place the exposed paper into the jar. Put the

cover over the jar and let the paper develop until the image appears.

NOTE: If the developing process takes too much time, shake up the gravel in the jar. If this does not work, add more ammonia.

SOURCE

Outdoor Biological Instructional Strategies. "Habitat Sun Prints." Lawrence Hall of Science. University of California, Berkley. 1975.

MUD FLAT

TEACHER'S GUIDE SHEET

Site Description

Mud flats are often called clam or worm flats as these organisms are the chief inhabitants. The flats are found in quiet bays or sounds, in back of barrier beaches. At low tide the mud is exposed to sunlight and weather. High tide covers the area. Organisms usually remain burrowed during low tide.

Mud flats hide such treasures as razor clams, quahogs, clam worms and hermit crabs. Large plants do not hold on the flat due to the constant movement of the mud.

**Plan to visit the mud flat at low tide.

Before the Trip

Using discussion, find out what the children already know about the mud flat. Record their ideas on an experience chart. Save the chart to compare with their knowledge later.

Questions for Discussion

a. What do you think a mud flat is?

b. Where could we find a mud flat?

c. What could we find there?

Field Trip

Special clothing

old pair of tennis shoes

shorts or a pair of pants which the legs can be rolled up

Materials

observation booklets
pencils
trowels
shovel
large tea strainer

Procedure for Investigation

1. Distribute the activity field guide booklets labeled "Mud Flat."
2. Have students do "What Do I See?" as they stand on the mud flat.
3. After students have finished "What Do I See?", have each child share his/her drawing with the class or assigned group.
4. Guide the students through the activities in the field guide. Discuss movement, protection and methods of obtaining food.

   Questions for Discussion

   a. What living things do you observe on the mud? In the mud?
   b. What clues can we find to indicate that these organisms are living?
   c. What would happen if the mud flat dried up?
   d. How do these organisms obtain food?
   e. What kind of plants do you observe?

After the Trip

Discuss and record on an experience chart what the children saw on the trip. Discuss with the children what they have learned.

Questions for Discussion

a. Why do animals live in the mud?
b. Why are there no large plants on the mud flats?
c. What would happen if we built a house on the mud flat?
d. How do razor clams get food?

Post Trip Activity

ARTISTIC CREATION (Child-Made Book)

Materials

crayons	white construction paper
markers	pencils

Procedure

1. Have the students draw a picture of something they experienced at the mud flat.
2. Have the students dictate sentence(s) about their particular picture. Write these on the page with their picture.
3. Compile the pages to form a booklet. Other subjects may be used.

*Alternative

Using the statements from the children, a story can be written and illustrations by the children may be used to complete the book.

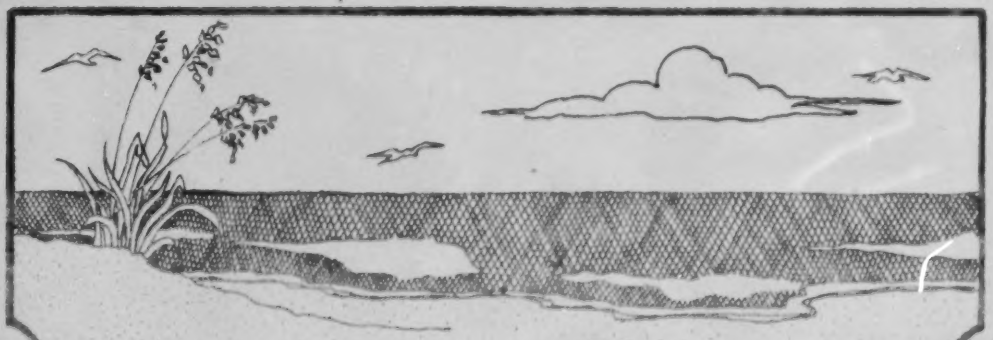
SANDY BEACH

Name _____

Date _____

Class _____

K-2c
3.2



A Project Cape

FIELD GUIDE

Authors

Michael Cowal
Nancy Cowal

Editor

Toni Weston

Artist

Alta Steed

Dr. Carolyn Hampton
Project Director

William T. Martin
Curriculum Specialist

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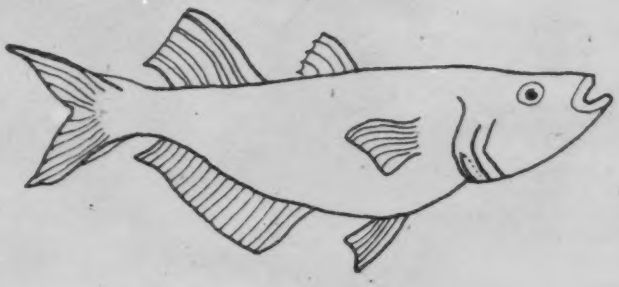
P.O. Box 640
Manteo, North Carolina 27954

American Beach Grass

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Laughing Gull

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	



Silversides

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Sanderling

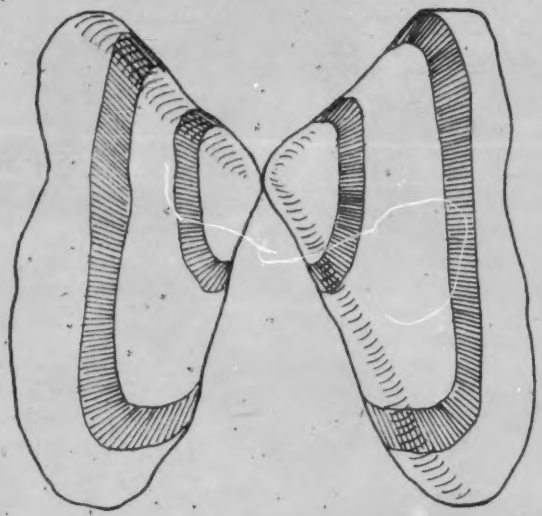
What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

What di

you see?

Ghost Crab

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

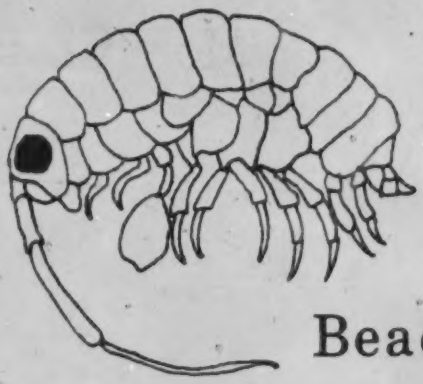


Coquina Clam

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Sea Oats

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	



Beach Flea

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Mole Crab

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Tern

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

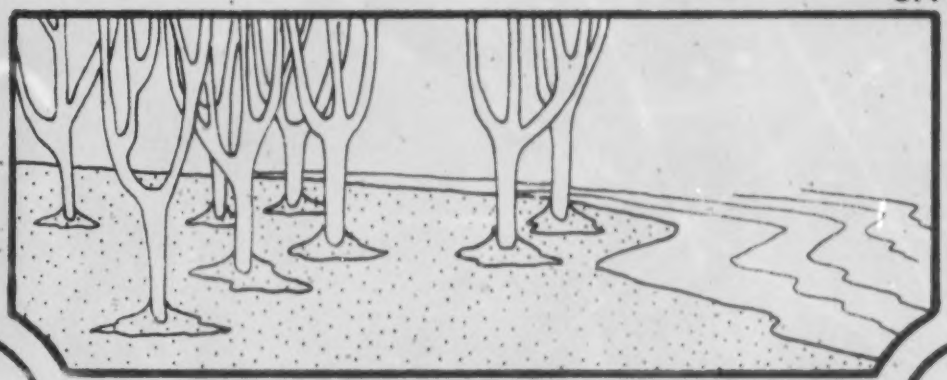
MUD FLAT

Name _____

Date _____

Class _____

K-2c
3.4



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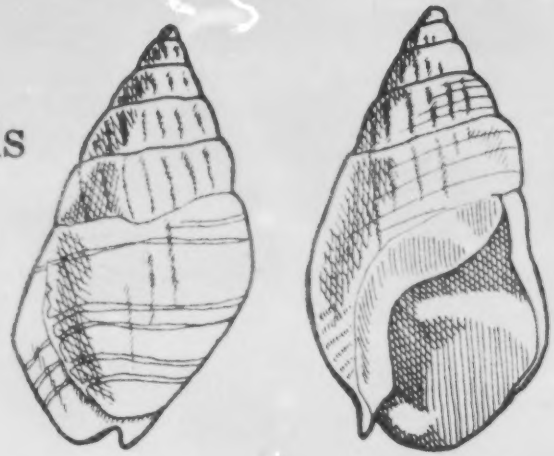
Scallop

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Herring Gull

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Mud Snails



What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

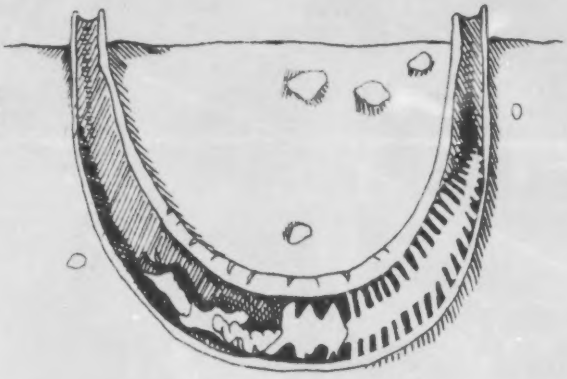
Yellowlegs

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

What di

you see?

Parchment Worm

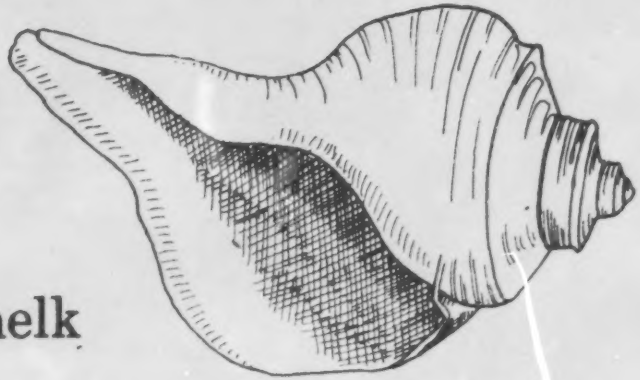


What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Razor Clam

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	**Animal**	

Whelk

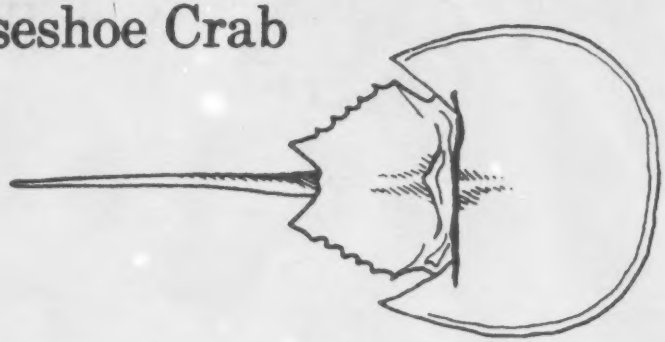


What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

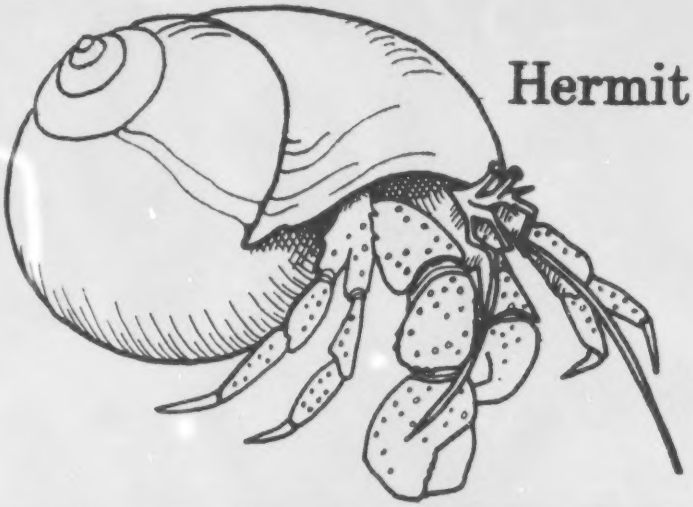
Moon Snail

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Horseshoe Crab



What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	



Hermit Crab

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

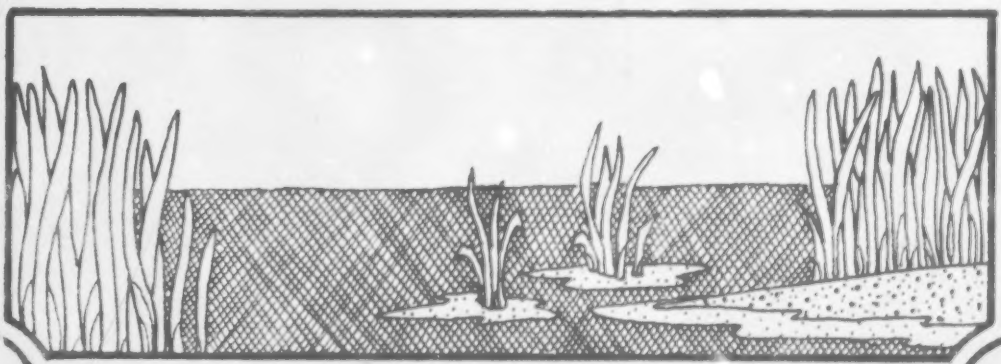
SALT MARSH

Name _____

Date _____

Class _____

K-2c
3.3



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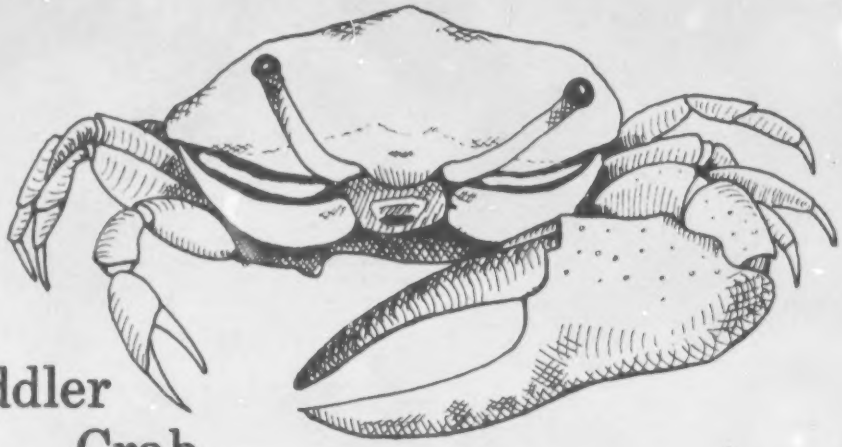


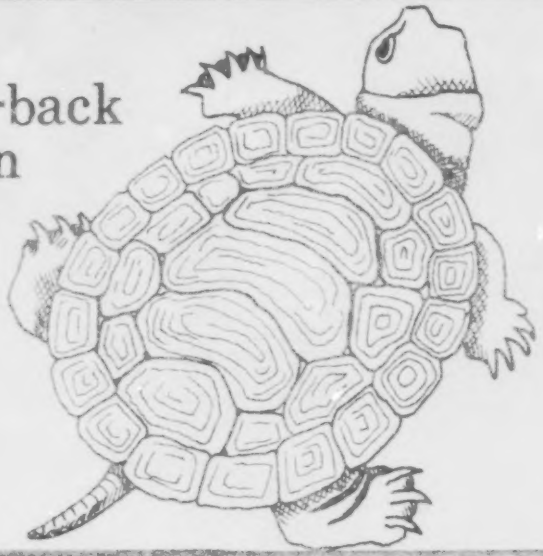
Fiddler Crab

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

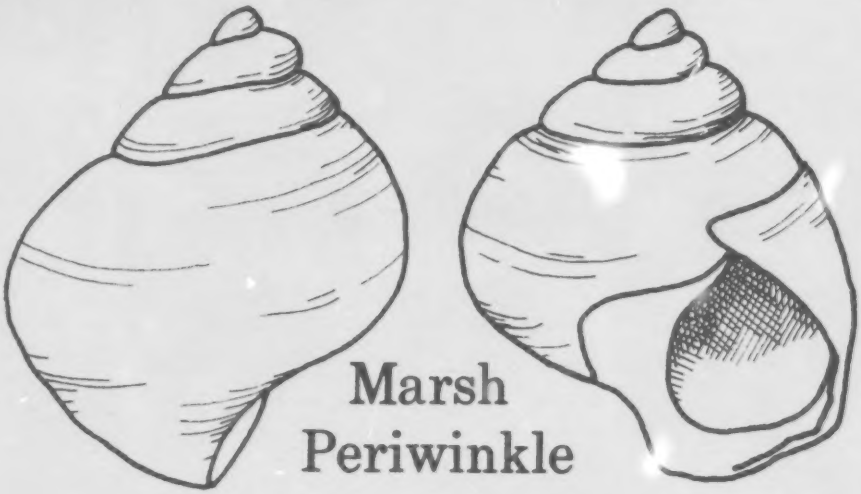
Saltmarsh Cordgrass

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Diamond-back Terrapin



What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	



Marsh Periwinkle

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

What di

you see?

Great Egret

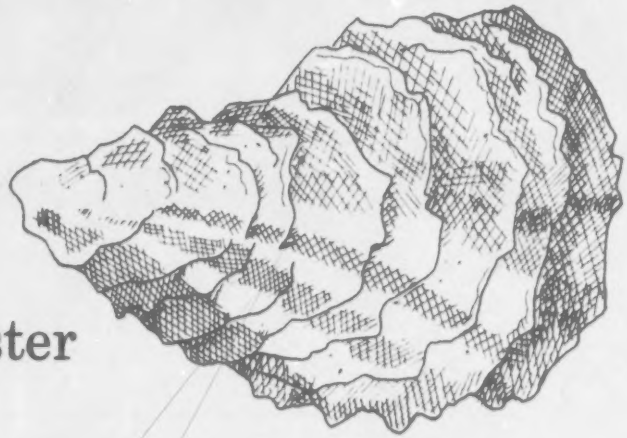
What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

Raccoon

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

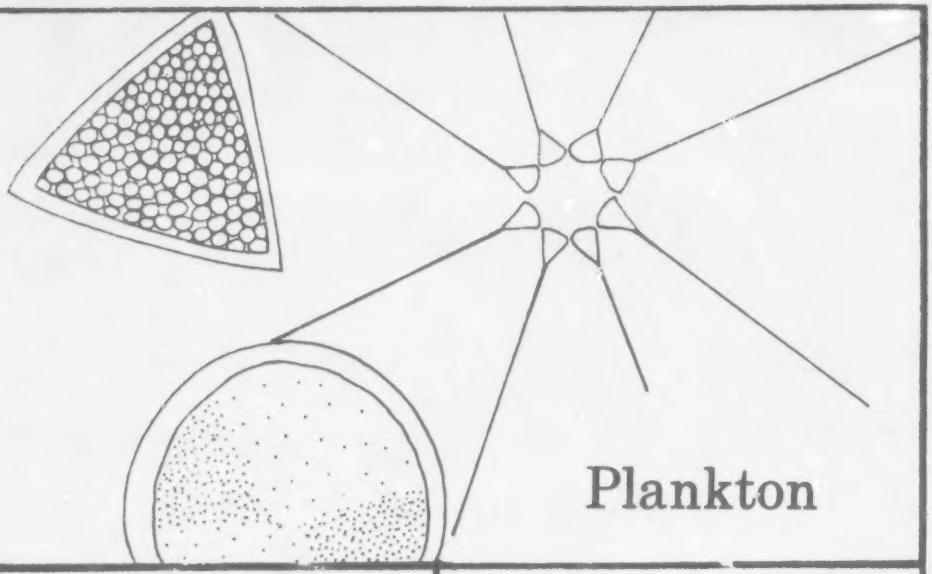
Great Blue Heron

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

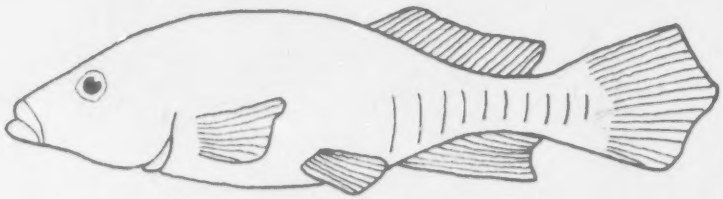


Oyster

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	



What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	



Killifish

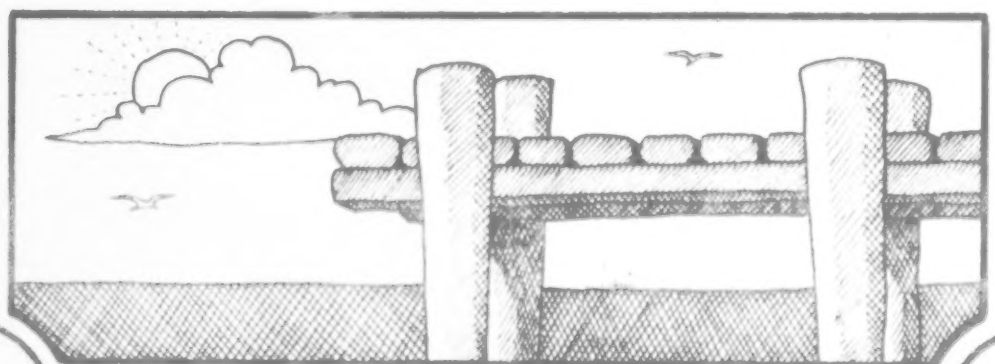
What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

PIER AND JETTY

Name _____

Date _____

Class _____



A Project Cape

FIELD GUIDE

Authors

Michael Cowal
Nancy Cowal

Editor

Toni Weston

Artist

Alta Steed

Dr. Carolyn Hampton
Project Director

William T. Martin
Curriculum Specialist

Developed under an ESEA Title IV-C Grant
Dare County Board of Education
P.O. Box 640
Manteo, North Carolina 27954

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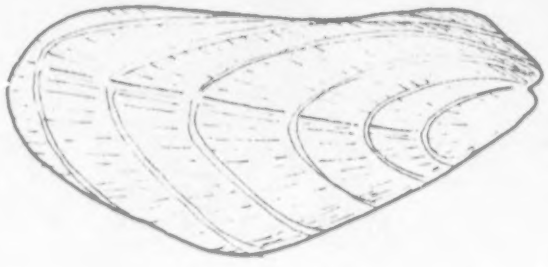
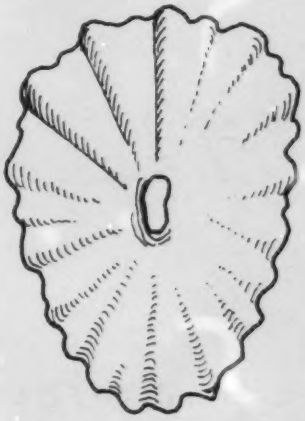
Mussel



What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

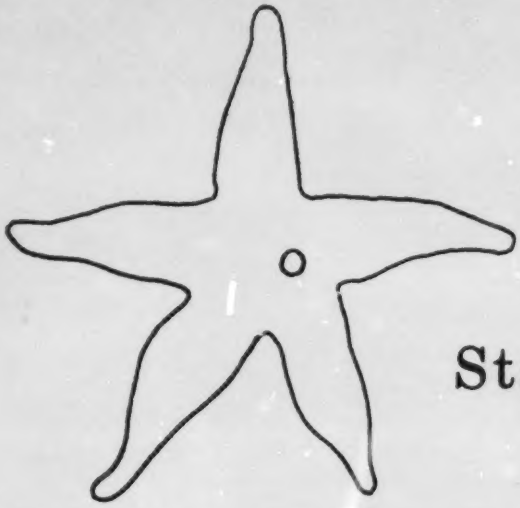
Sponge

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	



Limpet

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

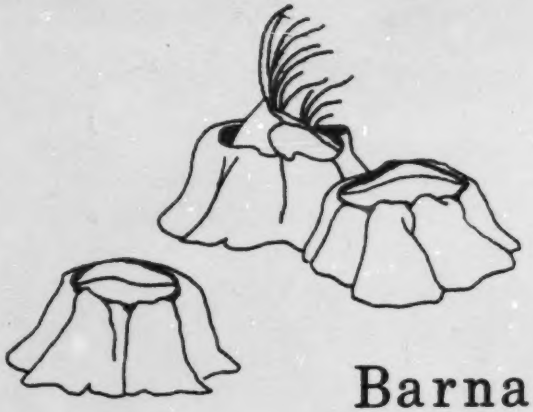


Starfish

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

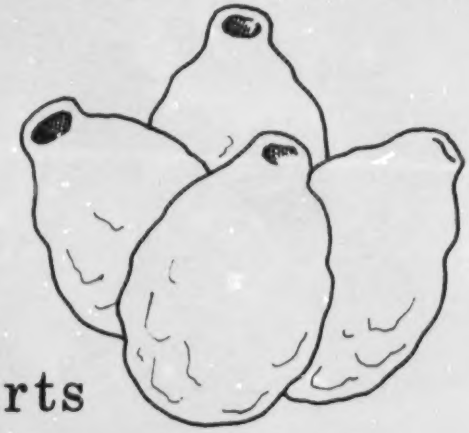
What di

you see?



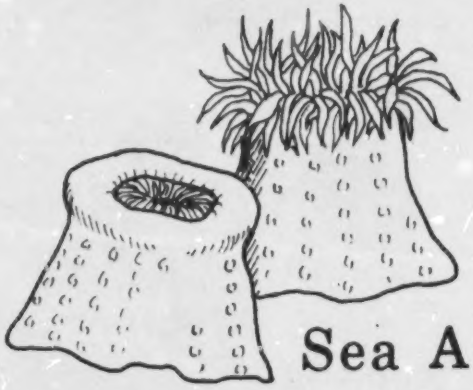
Barnacles

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	



Sea Squirts

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	



Sea Anemones

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
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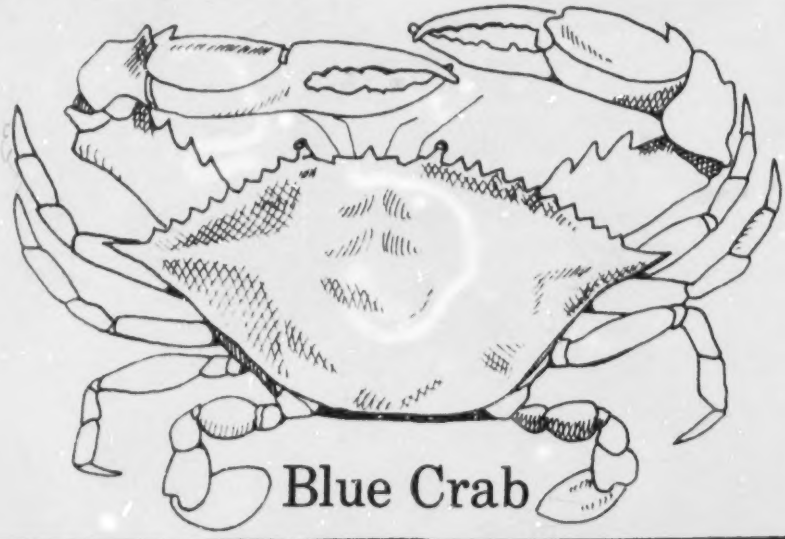

Blue Crab

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
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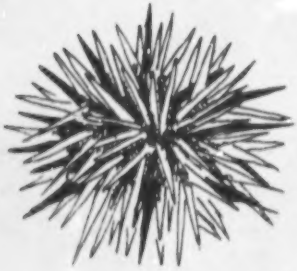

Sea Urchin

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
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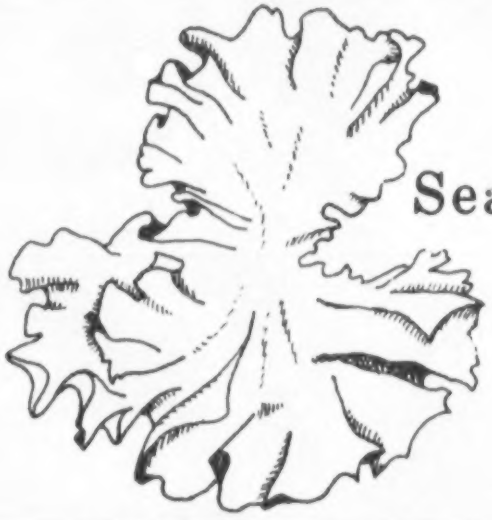
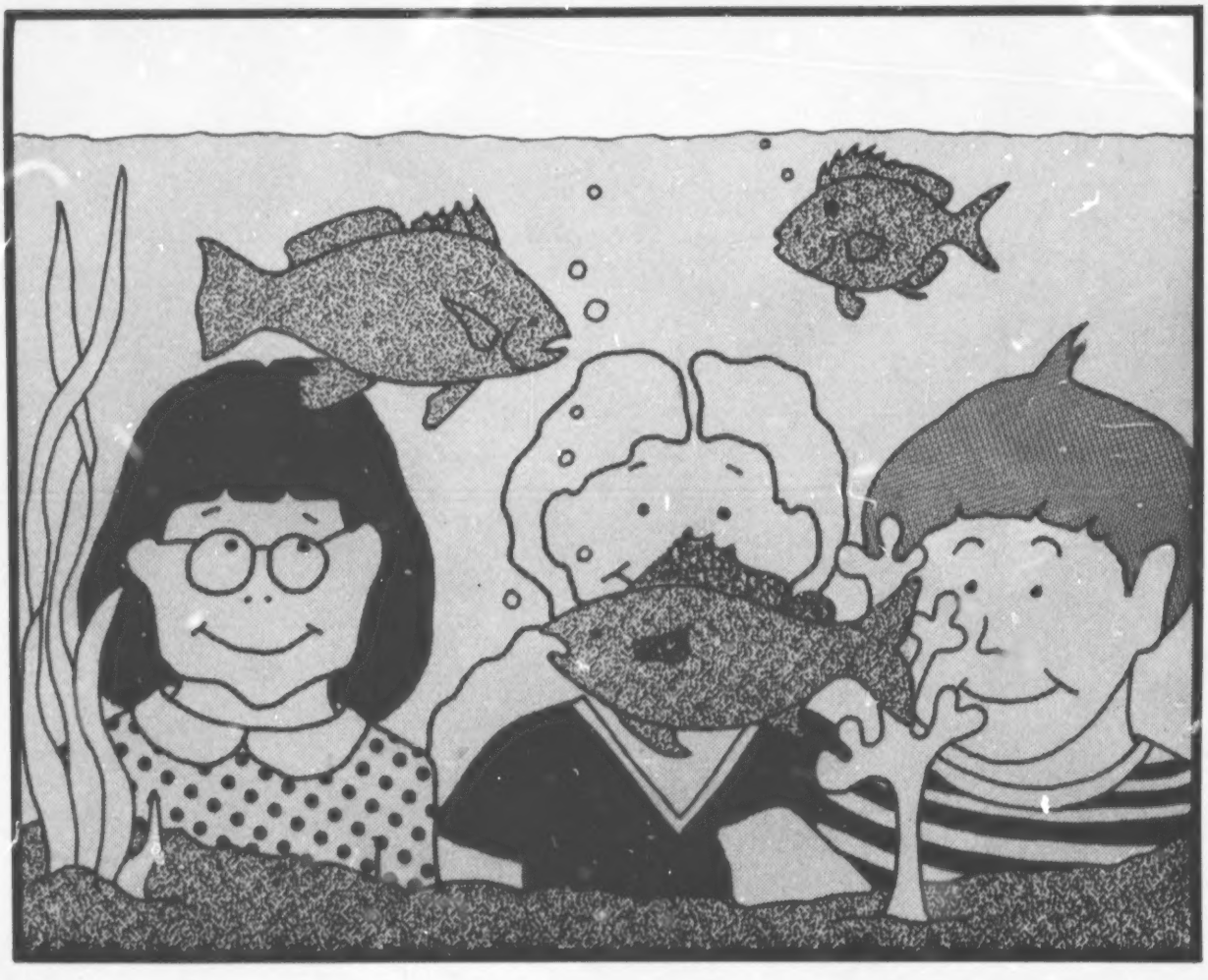


Sea Lettuce

What color is it?			
Does it move?	yes	no	?
Does it have eyes?	yes	no	?
How many legs does it have?	0 1 2 3 4 5 6 7 8 9 10		
What is its body covering?	Shell Scales Exoskeleton Skin Feathers Fur None		
Where is it found?			
Is it a plant or an animal?	Plant	Animal	

How to Set Up

A SALT WATER AQUARIUM



Written and Photographed by Michael and Nancy Cowal

Cape Hatteras School

Project Director, Dr. Carolyn H. Hampton
Curriculum Specialist, William T. Martin
Art, Alta Steed

Developed under an ESEA Title IV-C Grant
Dare County Board of Education
P.O. Box 640 Manteo, North Carolina 27954

How to Set Up a Salt Water Aquarium

****

Use an all glass or plastic aquarium.

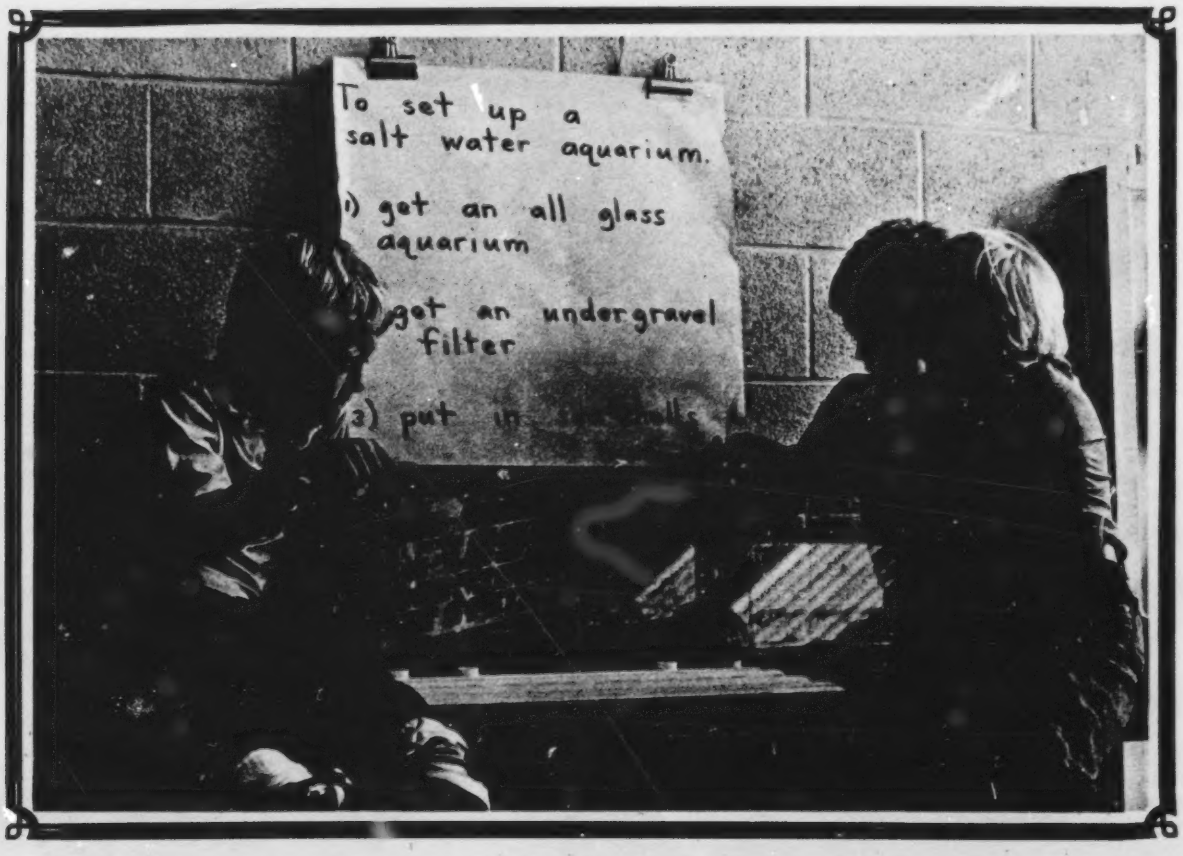
(Metal frames will rust and release toxic chemicals into the water.)

Get an undergravel filter.

Read the instructions.

(The air in the plastic tubes makes the water flow down through the shells. Bacteria that live on the filter break waste materials down so that they will not harm the animals.)

Place the undergravel filter in the aquarium and connect the plastic tubes.

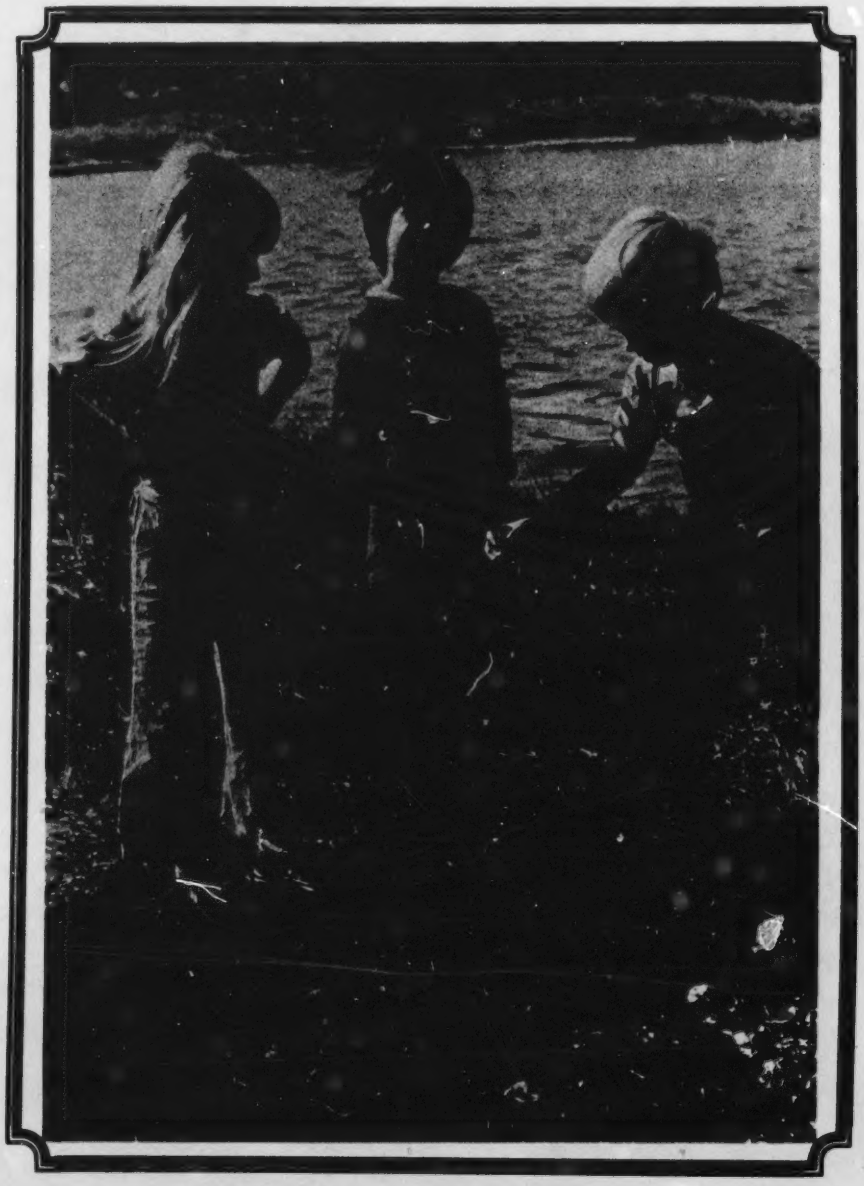


(Follow the directions that come with the filter. Connect the plastic tube from the filter to an aquarium pump. Plug the cord of the pump into a wall socket. Be sure to keep the electric cord dry.)

Take a class trip to the sound
to collect sea water. Sea water is salty.

(The aquarium will be a small ecosystem like the larger one in the sound or tidal pool.)

Collect shells to cover the filter system.

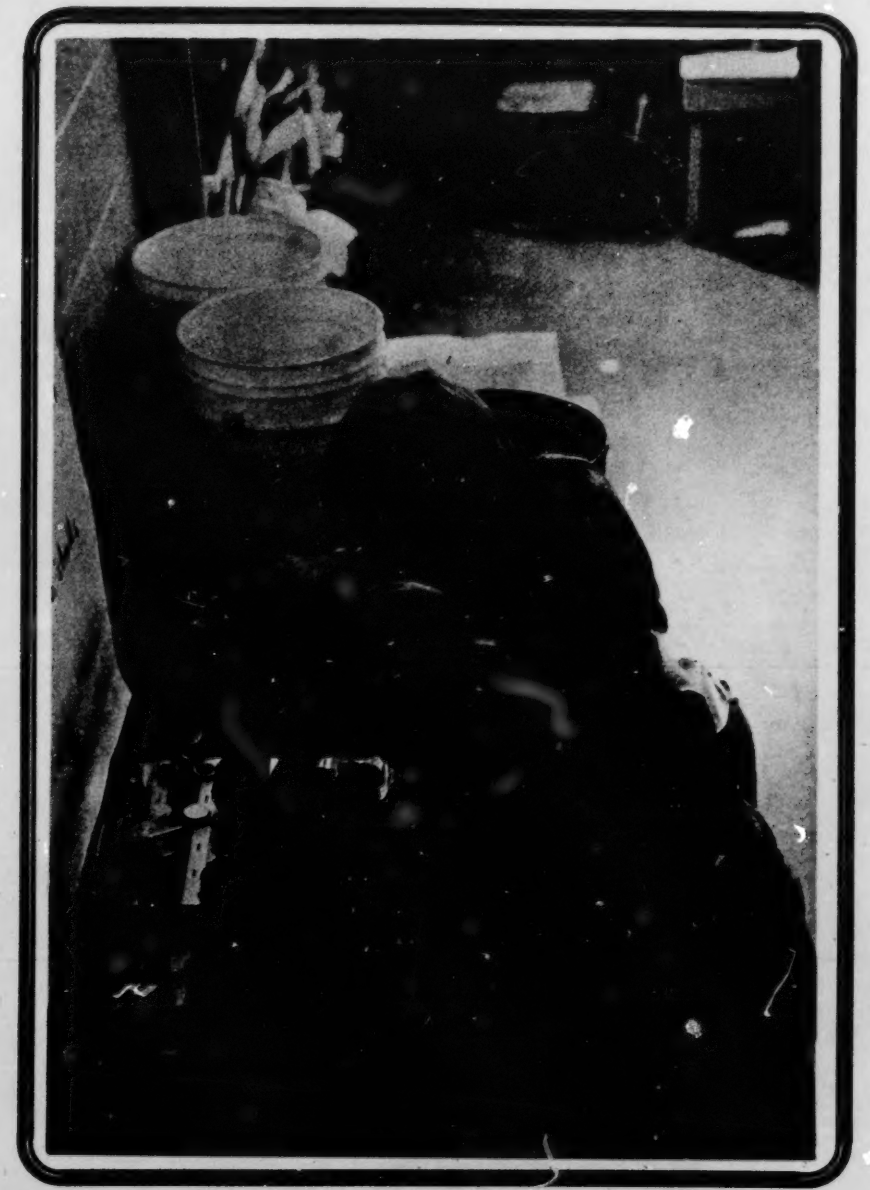


(Broken sea shells or crushed oyster shells make a good bottom for the aquarium.)

Wash the shells.

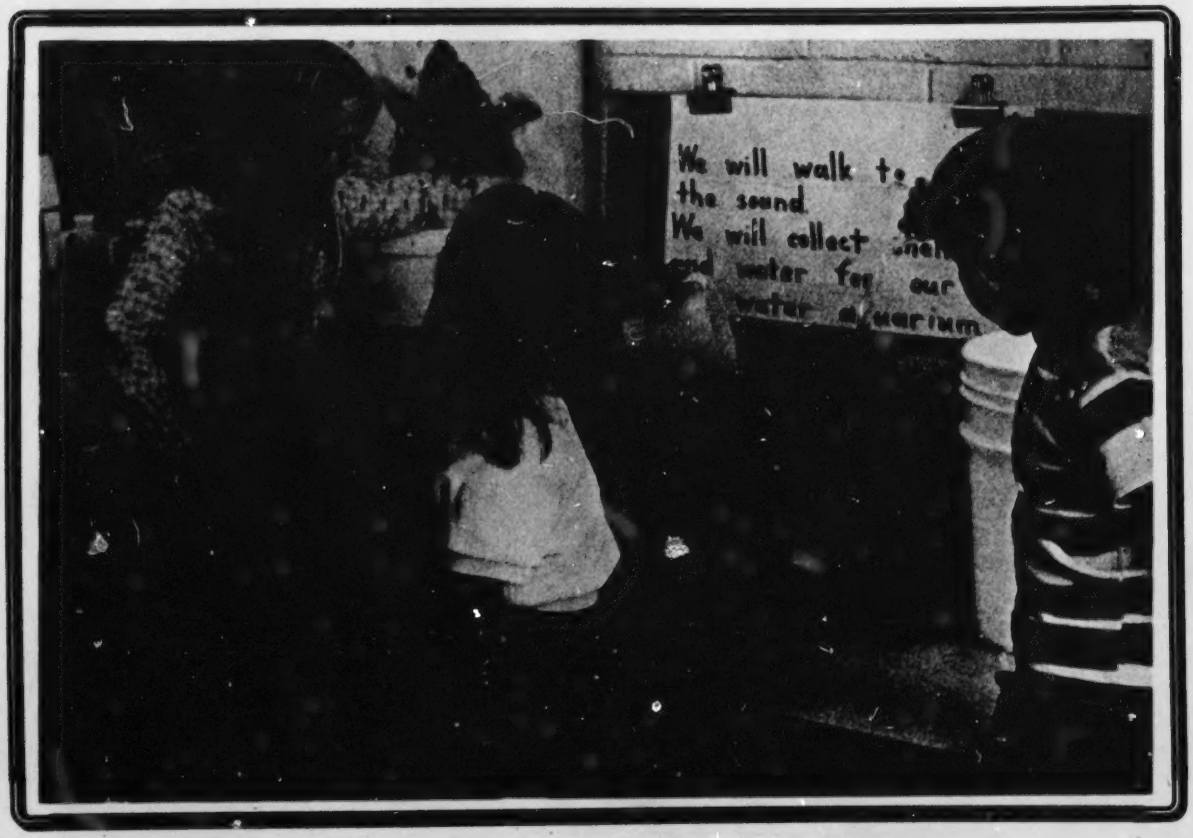
(Later some algae will grow on the shells.
Place the aquarium out of direct sunlight
or the algae will grow too rapidly.)

Place the shells over
the undergravel filter.



(Place the shells about 5 centimeters
deep on the bottom of the aquarium.)

Fill the aquarium with sea water.

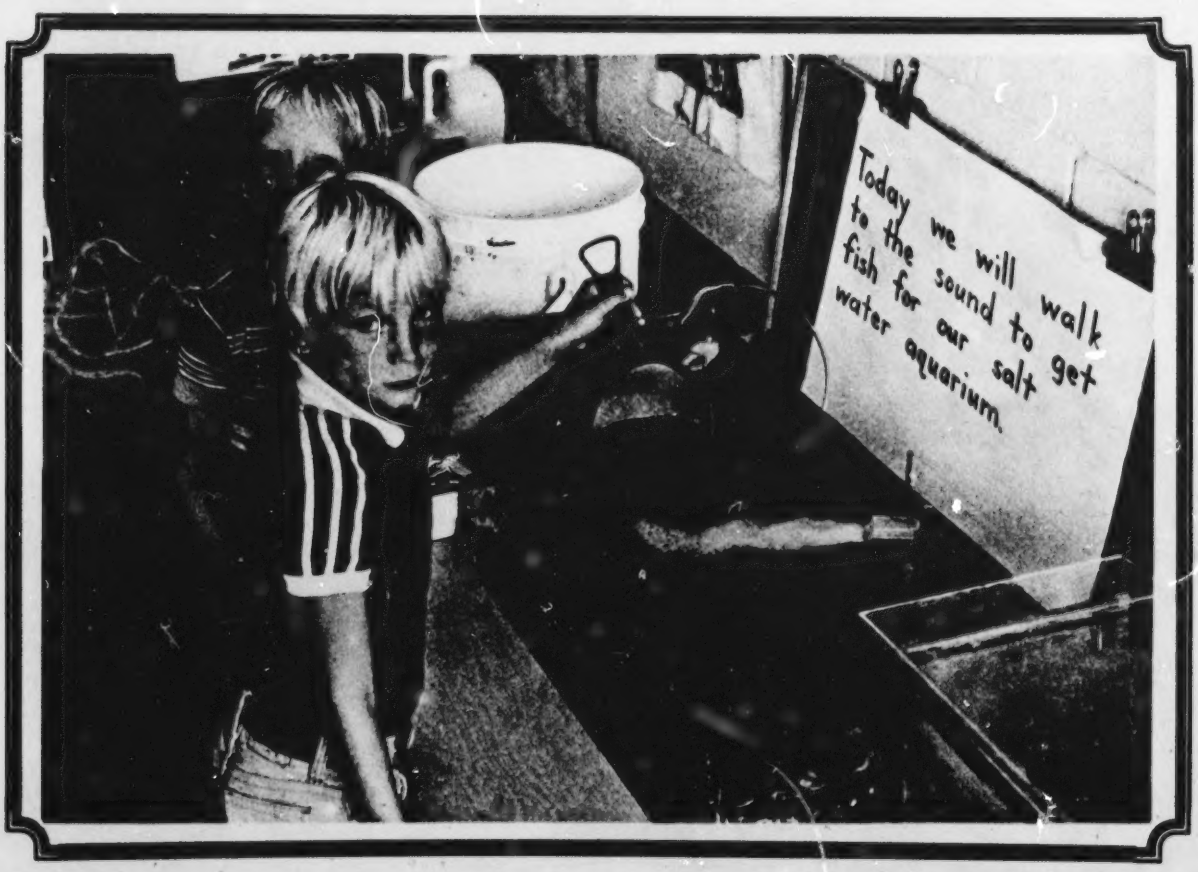


(Use a cover to keep the water from evaporating. A plastic cover is best. Mark the water level with a piece of tape. Once a month, replace one-fourth of the water. This will help keep wastes from accumulating.)

Now take a class trip to the sound or tidal pool to collect animals for your salt water aquarium. Carry the animals back to the class in plastic bags or cartons.

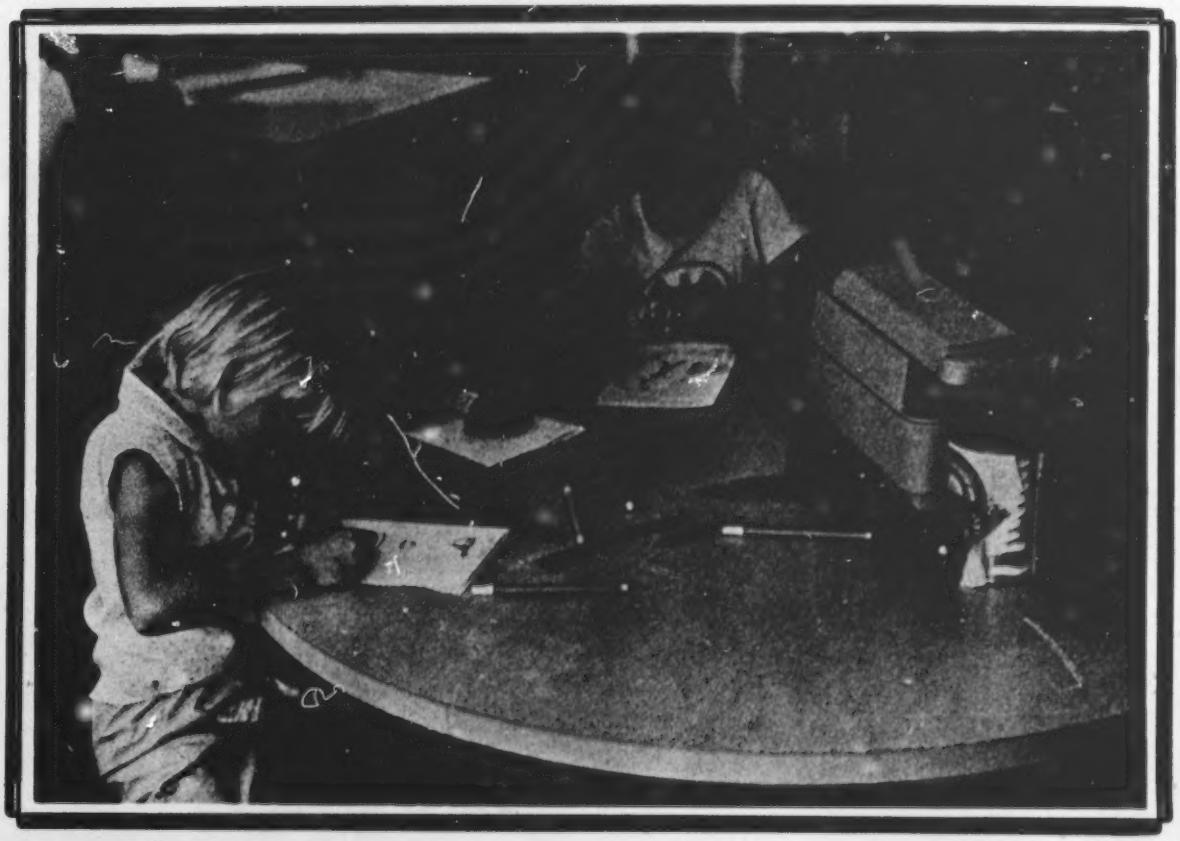
(Use a cast net, dip net, minnow seine, or a minnow trap to catch animals.)

Carefully place the animals in the aquarium.



(Before adding specimens to the aquarium, place the container in the water until the temperature of the water in the container is the same as the water in the aquarium.)

Make books about all these experiences.



(A piece of heavy weight art paper folded over makes a good four page book. Have pupils draw pictures. The teacher may type or print sentences dictated by the pupils.)

Read experience charts and math problems about animals that live or get eaten or die.

(Have the pupils copy experience charts for handwriting lessons and read them to parents for homework. You may find that the community will become interested and persons will contribute specimens for the aquarium.

SHORT ARTICLE "CARE AND MAINTENANCE OF A SALTWATER AQUARIUM" DELETED DUE TO COPYRIGHT RESTRICTIONS.